From: "Chris Mathis" <Chris.Mathis@charter.net>
To: <cgekas@energy.state.ca.us>
Date: 9/18/2007 8:26 PM
Subject: Comments on Proposed Commercial Roofing Insulation Requirements (from R. C Mathis)
Attachments: SSPC 90.1 2 IECC ASHRAE Code Change 901 Proposal 2007-07-09.doc

CC: <mshirakh@energy.state.ca.us>, "Charles Eley" celey@archenergy.com

Dear Mr. Gekas:

We have several concerns with the draft (pre-)45 day language for Subchapter 6, Section 149 regarding Additions, Alterations and Repairs to commercial buildings in California.

The essence of our comments is as follows:

1. Existing commercial buildings contribute significantly to the energy and demand loads in CA;

2. Commercial building owners will NEVER have a better opportunity for improving the insulation levels in the roofs of these buildings than when they are replacing or repairing the existing roofing system;

3. The proposed insulation levels in the pre-45 day language are well below the cost-effective values adopted by ASHRAE for its Standard 90.1; and,

4. California should AT LEAST embrace the ASHRAE-adopted values for commercial roofs, especially when replacing the roof surface.

Attached to this email are the climate zone-specific changes to roof insulation levels recently embraced by ASHRAE. You will see that for all California climate zones, the above-deck roof insulation levels are now at R-20 (they have bee R-15 since the 1989 version of the Standard). ASHRAE has submitted these new roof R-values for adoption to the International Energy Conservation Code. (The attached file is from ASHRAE's code proposal to the IECC on this topic.)

Table 149-A shows values of R-8 and R-14 for all climate zones in California. These values are BELOW those in the 1989 version of the ASHRAE Standard!

While we applaud the planned efforts to embrace cool roof technologies, we encourage you to FIRST embrace the proven, durable energy savings delivered by reasonable levels of roof insulation.

We encourage you to immediately raise all of the values in Table 149-A to AT LEAST the ASHRAE minimums of R-20.

Thanks you for your consideration of this request. We'd be happy to answer any questions you may have on the ASHRAE adopted values and their appropriateness for California.

Sincerely,
Chris Mathis

R. Christopher Mathis
President
Mathis Consulting Company
One Page Avenue, Suite 325
Asheville, NC 28801

828-678-3500

Table 502.2(1)
BUILDING ENVELOPE REQUIREMENTS – OPAQUE ASSEMBLIES

CLIMATE ZONE	1	2	3	4 except Marine	5 and Marine 4	6	7	8
Roofs								
Insulation entirely above deck	R-15 ci	R-~~15~~20 ci	R-~~15~~20 ci	R-~~15~~20 ci	R-20 ci	R-20 ci	R-~~25~~20 ci	R-~~25~~20 ci
Metal buildings (with R-5 thermal blocks[a])[b]	R-19+ R-10	R-19	R-19	R-19	R-19	R-19	R-19 + R-10	R-19 + R-10
Attic and other	R-30	R-~~30~~38	R-~~30~~38	R-~~30~~38	R-~~30~~38	R-~~30~~38	R-38	R-~~38~~49
Walls, Above Grade								
Mass	NR	~~NR~~R-5.7 ci[c]	R-~~5.7~~7.6 ci[e,e]	R-~~5.7~~9.5 ci[e]	R-~~7.6~~11.4 ci	R-~~9.5~~ 13.3 ci	R-~~11.4~~15.2 ci	R-~~13.3~~15.2 ci
Metal building[b]	R-13	R-13	R-13	R-13	R-13 + R-13	R-13 + R-13	R-13 + R-13	R-13 + R-13
Metal framed	R-13	R-13	R-13 + R-3.8 ci	R-13 + R-7.5 ci	R-13 + R-~~3.8~~7.5 ci	R-13 + R-~~3.8~~7.5 ci	R-13+ R-7.5 ci	R-13+ R-7.5 ci
Wood framed and other	R-13	R-13	R-13	R-13	R-13 + R-3.8 ci	R-13 + R-7.5 ci	R-13 + R-7.5 ci	R-13+ R-~~7.5~~15.6 ci
Walls, Below Grade								
Below grade wall[d]	NR	NR	NR	NR	~~NR~~R-7.5 ci	~~NR~~R-7.5 ci	R-7.5 ci	R-7.5 ci
Floors								
Mass	NR	R-~~5~~6.3 ci	R-~~5~~6.3 ci	R-~~10~~8.3 ci	R-10.4 ci	R-~~10~~12.5 ci	R-~~15~~12.5 ci	R-~~15~~14.6 ci
Joist/Framing	NR	R-19	R-19	R-~~19~~30	R-~~19~~30	R-30	R-30	R-~~30~~38
Slab-on-Grade Floors								
Unheated slabs	NR	NR	NR	NR	NR	~~NR~~R-10 for 24 in. below	~~NR~~R-15 for 24 in. below	R-~~10~~15 for 24 in. below
Heated slabs	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-~~7.5~~10 for ~~12~~24 in. below	R-~~7.5~~15 for ~~12~~24 in. below	R-~~7.5~~15 for ~~12~~24 in. below	R-~~10~~15 for ~~36~~24 in. below	R-~~10~~20 for ~~36~~24 in. below	R-~~10~~20 for 48 in. below
Opaque Doors								
Swinging	U-0.70	U-0.70	U-0.70	U-0.70	U-0.70	U-0.70	U-~~0.70~~0.50	U-0.50
Roll-up or sliding	U-1.45	U-1.45	U-1.45	U-~~1.45~~0.50	U-~~1.45~~0.50	U-0.50	U-0.50	U-0.50

For SI: 1 inch = 25.4 mm
ci – Continuous Insulation
NR – No Requirement
a. Thermal blocks are a minimum R-5 of rigid insulation, which extends 1-inch beyond the width of the purlin on each side, perpendicular to the purlin.
b. Assembly descriptions can be found in Table 502.2(2).

c. R-5.7 ci may be substituted with concrete block walls complying with ASTM C90, ungrouted or partially grouted at 32 in. or less on center vertically and 48 in. or less on center horizontally, with ungrouted cores, filled with material having a maximum thermal conductivity of 0.44 Btu-in./h-ft^2 F.
d. When heated slabs are placed below grade, below grade walls must be meet exterior insulation requirements for perimeter insulation according to the heated slab-on-grade construction.
~~e. Insulation is not required for mass walls in Climate Zone 3A located below the "Warm-Humid" line, and in Zone 3B.~~

Table 502.2(3)
BUILDING ENVELOPE REQUIREMENTS – OPAQUE ASSEMBLIES
Maximum U-Factor, C-Factor, and F-Factor

CLIMATE ZONE	1	2	3	4 except Marine	5 and Marine 4	6	7	8
Roofs								
Insulation entirely above deck	U-0.063	~~U-0.063~~ U-0.048	~~U-0.063~~ U-0.048	~~U-0.063~~ U-0.048	U-0.048	U-0.048	~~U-0.039~~ U-0.048	~~U-0.039~~ U-0.048
Metal buildings (with R-5 thermal blocks[a])[b]	U-0.052	U-0.065	U-0.065	U-0.065	U-0.065	U-0.065	U-0.052	U-0.052
Attic and other	U-0.034	~~U-0.034~~ U-0.027	~~U-0.034~~ U-0.027	~~U-0.034~~ U-0.027	~~U-0.034~~ U-0.027	~~U-0.034~~ U-0.027	U-0.027	~~U-0.027~~ U-0.021
Walls, Above Grade								
Mass	U-0.580	~~U-0.580~~ U-0.151	~~U-0.151~~ U-0.123	~~U-0.151~~ U-0.104	~~U-0.123~~ U-0.090	~~U-0.104~~ U-0.080	~~U-0.090~~ U-0.071	~~U-0.080~~ U-0.071
Metal building[b]	U-0.113	U-0.113	U-0.113	U-0.113	U-0.057	U-0.057	U-0.057	U-0.057
Metal framed	U-0.124	U-0.124	~~U-0.124~~ U-0.084	~~U-0.124~~ U-0.064	~~U-0.084~~ U-0.064	~~U-0.084~~ U-0.064	U-0.064	U-0.064
Wood framed and other	U-0.089	U-0.089	U-0.089	U-0.089	~~U-0.089~~ U-0.064	~~U-0.089~~ U-0.051	~~U-0.089~~ U-0.051	~~U-0.051~~ U-0.036
Walls, Below Grade								
Below grade wall[d]	C-1.140	C-1.140	C-1.140	C-1.140	~~C-1.140~~ C-0.119	~~C-1.140~~ C-0.119	C-0.119	C-0.119
Floors								
Mass	U-0.322	~~U-0.123~~ U-0.107	~~U-0.123~~ U-0.107	~~U-0.076~~ U-0.087	~~U-0.076~~ U-0.074	~~U-0.076~~ U-0.064	~~U-0.055~~ U-0.064	~~U-0.055~~ U-0.057
Joist/Framing	U-0.350	U-0.052	U-0.052	~~U-0.052~~ U-0.038	~~U-0.052~~ U-0.038	U-0.038	U-0.038	~~U-0.038~~ U-0.032
Slab-on-Grade Floors								
Unheated slabs	F-0.730	F-0.730	F-0.730	F-0.730	F-0.730	~~F-0.730~~ F-0.540	~~F-0.730~~ F-0.520	~~F-0.540~~ F-0.520
Heated slabs	F-1.020	F-1.020	~~F-1.020~~ F-0.900	~~F-1.020~~ F-0.860	~~F-0.950~~ F-0.860	~~F-0.840~~ F-0.860	~~F-0.840~~ F-0.843	~~F-0.780~~ F-0.688

Table 502.3
Building Envelope Requirements: Fenestration

CLIMATE ZONE	1	2	3	4 except Marine	5 and Marine 4	6	7	8
Vertical Fenestration (40% maximum of above-grade wall area)								
U-Factor								
Framing materials other than metal with or without metal reinforcement or cladding								
U-Factor	1.20	0.75	0.65	0.40	0.35	0.35	0.35	0.35
Metal framing with or without thermal break								

Curtain Wall/Storefront U-Factor	1.20	0.70	0.60	0.50	0.45	0.45	~~0.450~~.40	~~0.450~~.40
Entrance Door U-Factor	1.20	1.10	0.90	0.85	0.80	0.80	0.80	0.80
All Other U-Factor[a]	1.20	0.75	0.65	0.55	0.55	0.55	~~0.500~~.45	~~0.500~~.45
SHGC – All Frame Types								
SHGC: PF<0.25	0.25	0.25	0.25	0.40	0.40	0.40	~~NR~~0.45	~~NR~~0.45
SHGC: 0.25≤PF≤0.5	0.33	0.33	0.33	NR	NR	NR	NR	NR
SHGC: PF≥0.5	0.40	0.40	0.40	NR	NR	NR	NR	NR
Skylights (3% Maximum)								
U-Factor	0.75	0.75	0.65	0.60	0.60	0.60	0.60	0.60
SHGC	0.35	0.35	0.35	0.40	0.40	0.40	NR	NR

NR = No requirement
PF = Projection factor (See Section 502.3.2)
a. All others includes operable windows, fixed windows, and non-entrance doors.

Supporting Information (3.3.4 & 3.4):
The proposed changes come from addenda "as" and "at" to ANSI/ASHRAE/IESNA Standard 90.1-2004. These addenda have been incorporated into ANSI/ASHRAE/IESNA Standard 90.1-2007. The revised criteria are based on 2006 construction costs and fuel prices and went through the ANSI/ASHRAE/IESNA SSPC 90.1 public review process.